

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
16 October 2003 (16.10.2003)

PCT

(10) International Publication Number
WO 2003/085813 A3

(51) International Patent Classification⁷: G05F 1/10,
1/40, 1/44

(81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(21) International Application Number:
PCT/US2003/010013

(22) International Filing Date: 2 April 2003 (02.04.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/370,072 4 April 2002 (04.04.2002) US

(71) Applicant (*for all designated States except US*): THOMSON LICENSING S.A. [US/US]; 2 Independence Way - Suite 2, Princeton, NJ 08540 (US).

(72) Inventor; and

(75) Inventor/Applicant (*for US only*): MUTERSPAUGH, Max, Ward [US/US]; 7353 North Layman Avenue, Indianapolis, IN 46250 (US).

(74) Agents: TRIPOLI, Joseph, S. et al.; c/o Thomson Licensing Inc., 2 Independence Way - Suite 2, Princeton, NJ 08540 (US).

(84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

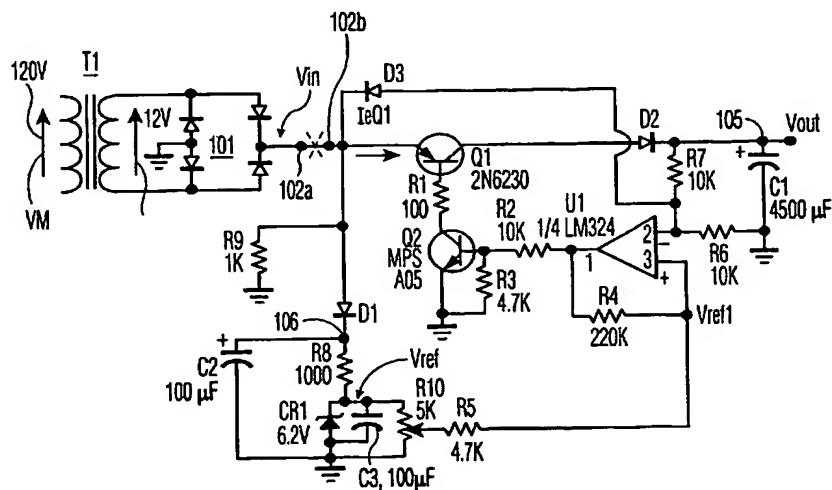
Published:

— with international search report

(88) Date of publication of the international search report:
19 February 2004

[Continued on next page]

(54) Title: LINE FREQUENCY SWITCHING REGULATOR



100

(57) Abstract: In a switch mode power supply (SMPS), a mains supply voltage source (VM) is coupled to a rectifier (101) for producing an input supply voltage. The rectified input supply voltage is coupled unfiltered to an input (Vin) of the SMPS. A switching power transistor (Q1) having a controllable duty cycle is controlled by a duty cycle modulated signal for producing a regulated output supply voltage from the rectified input supply voltage. The periodic waveform of the mains supply voltage is used to establish the timings of the duty cycle modulated signal. In each cycle, current flow is initiated in the transistor, when the transistor is already fully turned on and a voltage developed between its main current conducting terminals is low or close to zero volts. When the output supply voltage attains the required level the transistor is turned off. Hysteresis is provided for preventing the transistor from turning on again in the same cycle, after it has been turned off.

WO 2003/085813 A3

WO 2003/085813 A3



For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US03/10013

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : G05F 1/10, 1/40 1/44
 US CL : 323/ 282, 284, 285, 235

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
 U.S. : 323/ 282, 284, 285, 235

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
 NONE

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
 USPTO APS

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A, P	US 6,388,433 B2 (MARTY) 14 May 2002 (14.05.2002), see entire document.	1-13
A	US 4,507,546 A (FORTUNE et al) 26 March 1985 (26.03.1985), see entire document.	1-13
A	US 3,758,844 A (HARKENRIDER et al) 11 September 1973 (11.09.1973, see entire document.	1-13

Further documents are listed in the continuation of Box C.

See patent family annex.

* Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E" earlier application or patent published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means		
"P" document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search

19 June 2003 (19.06.2003)

Date of mailing of the international search report

24 OCT 2003

Name and mailing address of the ISA/US

Mail Stop PCT, Attn: ISA/US
 Commissioner for Patents
 P.O. Box 1450
 Alexandria, Virginia 22313-1450
 Facsimile No. (703)305-3230

Authorized officer

MICHAEL SHERRY
 Telephone No. 703.308.1680